Fact Sheet

United States Nuclear Regulatory Commission
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Dry Cask Storage of Spent Nuclear Fuel

Background

For years, nuclear power plants have temporarily stored used fuel, known as "spent fuel," in water pools at the reactor site. Periodically, about one-third of the nuclear fuel in an operating reactor needs to be unloaded and replaced with fresh fuel. Designers of nuclear power plants anticipated that the spent fuel would be reprocessed, with usable portions of the fuel to be recycled and the rest to be disposed as waste. However, commercial reprocessing was never successfully developed in the United States.

Congress gave the Department of Energy (DOE) responsibility for developing permanent disposal capacity for the spent fuel and other high-level nuclear waste, and in 2002 Congress and the President designated Yucca Mountain, Nevada, as the site for a proposed disposal facility. The disposal facility would be built and operated by DOE and licensed by the Nuclear Regulatory Commission (NRC). The Commission is an independent regulatory agency, not a part of the DOE, whose primary mission is to protect public health and safety, the common defense and security, and the environment in the use of nuclear materials.

Until a repository is available -- projected to be about 2010 -- spent nuclear fuel continues to be stored primarily in specially designed, water-filled pools at individual reactor sites around the country. This storage is authorized under the same license issued by NRC that authorizes reactor operation.

In the late 1970s and early 1980s, the need for alternative storage began to grow when pools at many nuclear reactors began to fill up with stored spent fuel. Utilities began looking at options for increasing spent fuel storage capacity. Current regulations permit reracking (placing fuel rod assemblies closer together in spent fuel pools) and fuel rod consolidation, subject to NRC review and approval, to increase the amount of spent fuel that can be stored in the pool. Both of these methods are constrained by the size of the pool.

Another option for increasing capacity is storage in an independent spent fuel storage installation (ISFSI). Such storage may be either at the reactor site or elsewhere. The spent fuel may be stored in wet or dry ISFSIs. Over the last decade, there has been increased interest in dry cask storage on-site by licensees to provide additional capacity for storing spent fuel.

There are two ways an ISFSI may be licensed. A "site-specific license" authorizes operation of a storage facility at a nuclear power plant or elsewhere, subject to the NRC's standard licensing requirements. The license specifies the type of storage system to be used. Alternatively, nuclear power plant operators may operate an ISFSI under a "general license" using NRC-approved dry storage casks. The general license option allows plants to avoid repeating certain evaluations (such as environmental impact or seismic reviews) that were already conducted for the plant's operating license.

In 1982, Congress passed the Nuclear Waste Policy Act, which directed the NRC to approve a means of interim dry storage by rulemaking, omitting site-specific evaluations "to the maximum extent practicable." The NRC amended its regulations in 1990 to authorize nuclear power plant licensees to store spent fuel at reactor sites in NRC-approved dry storage casks under a general license, without needing to submit an application for a specific license to store spent fuel at a particular site.

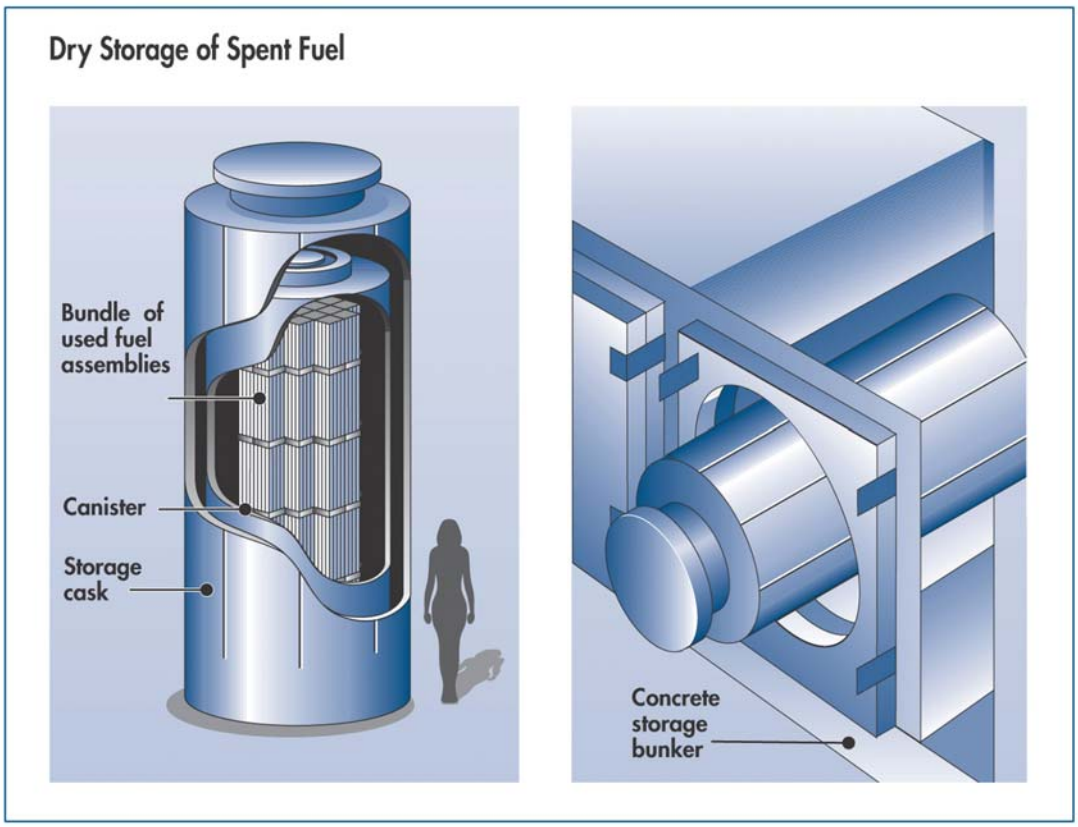
Discussion

The NRC reviews and approves the designs for spent fuel dry storage systems. The NRC's regulations for review are developed through a public process and provide a sound basis for determining whether use of a proposed storage system will protect public health and safety and the environment.

The NRC periodically inspects the design, fabrication, and the use of dry casks, to ensure licensees and vendors are performing activities in accordance with radiation safety and security requirements, and licensing and quality assurance program commitments.

Dry spent fuel storage in casks is considered to be safe and environmentally sound. Over the last 20 years, there have been no radiation releases which have affected the public, no radioactive contamination, and no known or suspected attempts to sabotage spent fuel casks or ISFSIs.

Cask designs approved for use under the general license are listed in the Commission's regulations in Title 10 of the Code of Federal Regulations under Part 72.214 and in the table at the end of this Fact Sheet. Casks typically consist of a sealed metal cylinder containing the spent fuel enclosed within a metal or concrete outer shell. In some designs, casks are placed horizontally; in others, they are set vertically on a concrete pad.

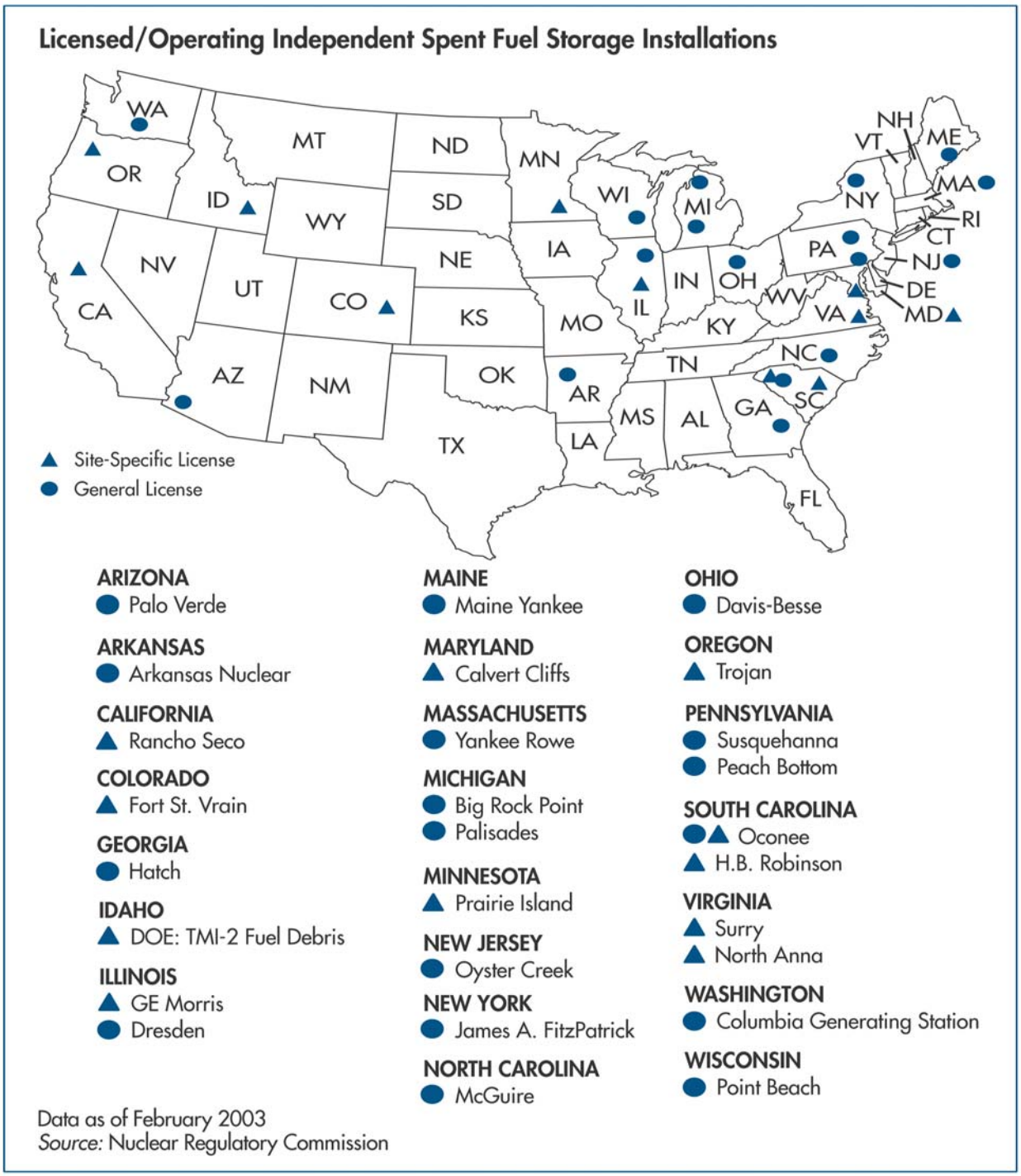


For approval of cask designs, the NRC conducts a technical review to ensure the design would be safe and secure for use at any licensed nuclear power plant site in the country, consistent with the requirements for a general license. [Additional information available at www.nrc.gov/waste/spent-fuel-storage .]

The casks used in the dry storage systems are designed to resist floods, tornadoes, projectiles, temperature extremes, and other unusual scenarios. NRC requires the spent fuel to be cooled in the spent fuel pool for several years before being transferred to dry casks. Typically, the maximum heat generated from 24 fuel assemblies stored in a cask is less than that given off by a typical home heating system in an hour. As the fuel cools further, the heat generated will decrease over time.

Spent fuel is currently kept in dry storage at ISFSIs located at 24 power plant sites, one decommissioned power plant site (Fort St. Vrain), two plants in the process of decommissioning (Rancho Seco and Trojan) and at an interim storage facility operated by DOE located at the Idaho National Engineering and Environmental Laboratory near Idaho Falls, Idaho. One additional ISFSI, the General Electric-Morris Operation in Illinois, is licensed for wet storage of spent fuel. The sites employing dry cask storage are noted in the table at the end of this Fact Sheet.

The NRC is also reviewing an application from Private Fuel Storage, LLC, to build an away-from-reactor independent spent fuel storage installation. This proposed privately-owned facility would be located on the reservation of the Skull Valley Band of Goshute Indians in Utah.



NRC-Approved Dry Spent Fuel Storage Designs Currently in Use

Model (Storage Design)	**Vendor**	**Date Approved (+ = for use under general license)**	**Facilities Where Used (* = specific license)**
CASTOR V/21 (Vertical Metal Cask)	General Nuclear Systems, Inc.	7/2/1986 8/17/1990+	Surry* (VA)
Fuel Solutions (Vertical Metal/ Concrete Cask)	BFNL Fuel Solutions	2/15/2001+	Big Rock Point (MI)
HI-STAR 100 (Vertical Metal Cask)	Holtec International	10/4/1999+	Hatch (GA) Dresden (IL)
HI-STORM 100 (Vertical Metal/ Concrete Cask)	Holtec International	3/31/1999 5/31/2000+	Trojan* (OR) Hatch (GA) Dresden (IL) Columbia (WA) FitzPatrick (NY)
NAC-I28 (Vertical Metal Cask)	NAC International	2/1/1990	Surry* (VA)
NAC-UMS (Vertical Metal / Concrete Cask)	NAC International	11/20/2000+	Maine Yankee (ME) Palo Verde (AZ)
NAC-MPC (Vertical Metal / Concrete Cask)	NAC International	4/10/2000+	Yankee Rowe (MA)
Advanced NUHOMS-24 (Horizontal Concrete Module)	Transnuclear, Inc.	02/05/2003+	San Onofre (CA)

Model (Storage Design)	**Vendor**	**Date Approved (+ = for use under general license)**	**Facilities Where Used (* = specific license)**
NUHOMS (Horizontal Concrete Module)	Transnuclear, Inc.	8/13/1986 1/29/1990 11/25/1992 6/30/2000 1/18/1995+	H.B. Robinson* (SC) Oconee* (SC) Calvert Cliffs* (MD) Rancho Seco* (CA) Davis-Besse (OH) Susquehanna (PA)
TN-32 (Vertical Metal Cask)	Transnuclear, Inc.	7/2/1986 6/30/1998 4/19/2000+	Surry* (VA) North Anna* (VA) McGuire (NC) Peach Bottom (PA)
TN-40 (Vertical Metal Cask)	Transnuclear, Inc.	10/19/1993	Prairie Island* (MN)
TN-68 (Vertical Metal Cask)	Transnuclear, Inc.	5/28/2000+	McGuire (NC) Peach Bottom (PA)
VSC-24 (Vertical Metal/ Concrete Cask)	BNFL Fuel Solutions Corp.	5/7/1993	Palisades (MI) Point Beach (WI) Arkansas Nuclear One (AR)

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